halstrup walcher

Manual

Pressure Controller REG 21

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On this Manual

This Manual serves to illustrate the capabilities and appropriate use of the Pressure Controller REG 21.

Inappropriate use or improper handling can lead to potential hazards for persons and intrinsic values. Therefore, any person entrusted with working with the device must be instructed and aware of the potential risks. This manual and its safety notices in particular must be adressed to with care. **If any doubts occur concerning the proper understanding of any paragraph of this manual, please consult the manufacturing company.**

Handle this manual with care:

- It has to be kept within reach as long as the device is on service.
- It has to be handed over to successive personnel.
- Any supplements edited by the manufacturer must be inserted in this manual.

The manufacturer reserves the rights to carry on with the development of this device without documenting each step. Please address your manufacturer if you have any questions as to the relevance of this manual.

Conformity

This device was developed according to state-of-the-art Technology. It meets the demands of EC law and guidelines. This is confirmed by the CE label. CE

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Content

1 Safety Notices

1.1 Appropriate Use

The REG 21 Pressure Controller serves to measure, indicate, control and regulate positive and negative excess pressure or differential pressure, respectively of non-aggressive, gaseous substances.

The operating requirements indicated on the label and in the chapter “Technical Data” must be met. This refers particularly to the permissible supply voltage.

The device may only be operated in accordance with this manual. It is prohibited to open the device and carry out technical changes. The manufacturer does not accept liability for damages due to improper handling. In a case as such all warranty claims expire.

1.2 Transport, Installation, Connection and Activation

Never shut the pressure ports during transport! Barometric pressure alterations may harm low measuring range devices.

Installation and electric connections must be carried out by suitably qualified personnel. The plant operator is responsible for instructing and comissioning the personnel.

The device operator must be instructed by and act on behalf of the plant operator.

Do not carry out functional tests by means of compressed or breathing air. This may harm low measuring range devices.

Do not expose the device to direct sunlight, as this may lead to measuring errors.

Watch the specific safety instructions indicated in the respective chapters.

1.3 Trouble, Maintenance, Repair, Disposal

If the instructions of chapter 6 do not suffice to cope with occurring trouble, it is compulsory to call the personnel responsible for the electric connections.

The responsible personnel will put the device out of operation and secure it against accidental use until all repairs are finished.

The device is maintenance-free.

Repairs that require opening the device may be carried out exclusively by the manufacturer.

The electronic components contain both ecologically damaging and recyclable substances and materials. After its final deactivation the device must undergo recycling. The environmental guidelines of the relevant country must be obeyed.

1.4 Legend

The following symbols refer to specified dangers concerning the operation of the REG 21:

WARNING! *If you don’t follow the instructions, dangers incur that can severely damage your health and may even be lethal.*

ATTENTION! *If you don’t follow the instructions, dangers incur that may severely damage the property.*

INFORMATION! *This paragraph entails important information regarding the appropriate use of the device.*

2 Technical Description

2.1 Functional Specifications

The REG 21 Pressure Controller measures the differential pressure between its two pressure ports leading to the two chambers of a pressure measuring unit. The measuring process is carried out by means of a beryllium bronze diaphragm, which aligns according to the pressure differences between the two chambers. The deflection of the membrane is measured by inductive pick-ups. The device entails no parts subject to mechanical or friction-induced wear and tear. It fulfills the following functions:

- Indication of measurements
- Indication of voltage levels (optional electric current levels) in accordance to measurements
- works as two or three point regulator by means of its two switching ports

Further notable features:

- overload protection
- adjustable hysteresis
- high sensitivity
- very precise and enduring
- automatic recalibration of the zero point
- low sensitivity to changes of vicinity temperature

2.2 Components

2.2.1 Inputs and Outputs

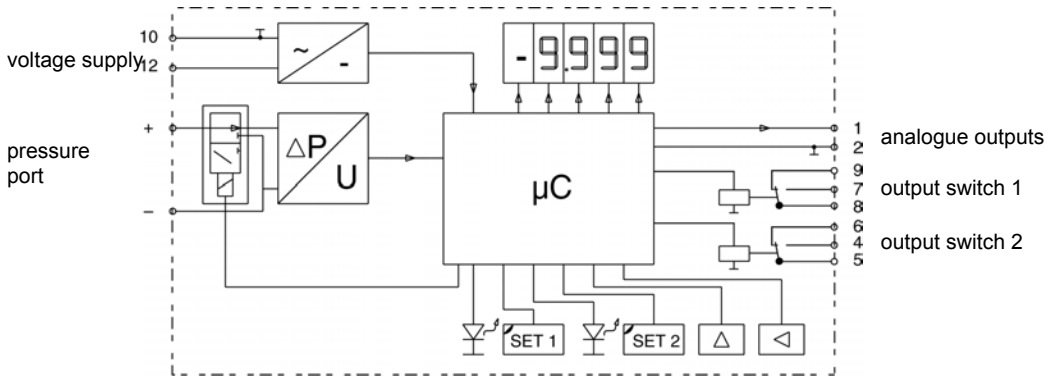


Illustration 1 circuit diagram

voltage supply: depending on the variant either 230 V-AC, 115 V-AC, 24 V-AC or 24 V-DC. The relevant voltage supply is indicyted on the device's label.

pressure port: "-" indicates reference pressure; "+" indicates measured pressure. The measuring range is indicated on the label.

analogue output: The REG 21 provides electrical currents ranging between 0…10 V (optionally -5…+5 V or 4…20 mA or 0…20 mA) in proportion to the pressure measured. The range of analogue outputs corresponds to the measuring range. The type of the analogue output is indicated on the device label.

output switches 1 and 2: The device can be equipped with two relay ouput connections or alternatively with two transistor output connenctions. The type of output connections is indicated on the label. The outputs react as soon as the measured pressure exceeds or falls short of the programmed switching values. The exact procedure is descripted in detail in chapter 2.5. The relays are change-over switch relays. The transistors are bipolar PNP-transistors. This enables you to realize open-collector- or open-emitter-switches.

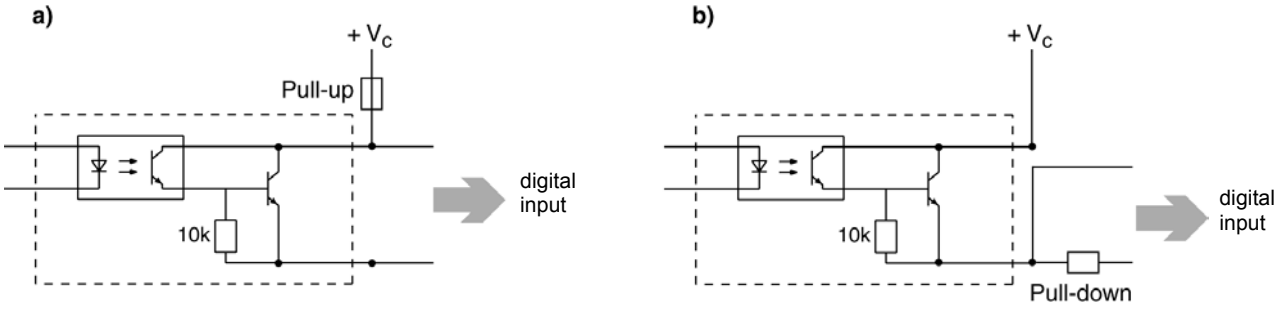


Illustration 2 transistor switch (optional) a) open-collector-wiring, b) open-emitter-wiring

2.2.2 Indicating Instruments

Illustration 3 front view

Display: The display shows the measured differential or excess pressure. The unit is indicated to the right of the display. Positive values are shown without sign, negative values with a minus set in front.

LED 1 shows the actual state of switch connection 1. It flashes on if the actual value is higher or lower than the switch-on value of switch connection 1 (see illustration 4).

LED 2: Analogous to LED 1 this LED illustrates the actual state of switch connection 2.

2.2.3 Keyboard

Four keys serve to set the REG 21. They fulfill the following functions:

Set 1 , Set 2	**set keys** • Calling up and quitting parameter setting and display • Saving of parameters
◀	**enter key:** • starting or finishing settings • setting decimal places and signs
▲	**shift key:** • selection of parameters and values • selection of figures

Diagram 1

2.3 Operational Functions

The operational functions of the REG 21 cover parameter setting, display of switch connection parameters and manual zero point calibration.

Call up the different functions by using the **Set Keys**. Using key combinations or pressing single keys for several seconds different functions calls up different functions. Flashing decimal points below the measuring values generally indicate that you're leaving the display mode (see illustration 7).

Function	**Call-up keys**	**Sequence**
Parameter functions		
basic settings	Set 1 + Set 2 press for < 2 s simultaneously*	see chapter 5.1
setting the parameters of switch connection 1	Set 1 press for > 2 s**	see chapter 5.1
setting the parameters of switch connection 2	Set 2 press for > 2 s**	see chapter 5.1
Display functions		
displaying switch connection 1 parameters	Set 1 press for < 2 s*	sequence: switch-on value, switch-off value, switch direction (see chapter 2.5) successively; afterwards switch back to actual measuring value.
displaying switch connection 2 parameters	Set 2 press for < 2 s*	sequence: switch-on value, switch-off value, switch direction (see chapter 2.5) successively; afterwards switch back to actual measuring value.
other functions		
starting manual zero point calibration	Set 1 + Set 2 press for > 2 s simultaneously**	automatic zero point calibration; afterwards switch back to actual measuring value.
* press for < 2 s: press keys until the decimal points in the display start flashing (see illustration 7 (2)) ** press for > 2 s: press keys until the release code "PPP" flashes on (see illustration 7 (3))		

Diagram 2 operational functions of the device REG 21

2.4 Device Parameter

By changing the parameters the REG 21 can adjust to several different applications. See chapter 5.1 for a detailed description of how to set the parameters. Diagram 3 shows the range of available parameters.

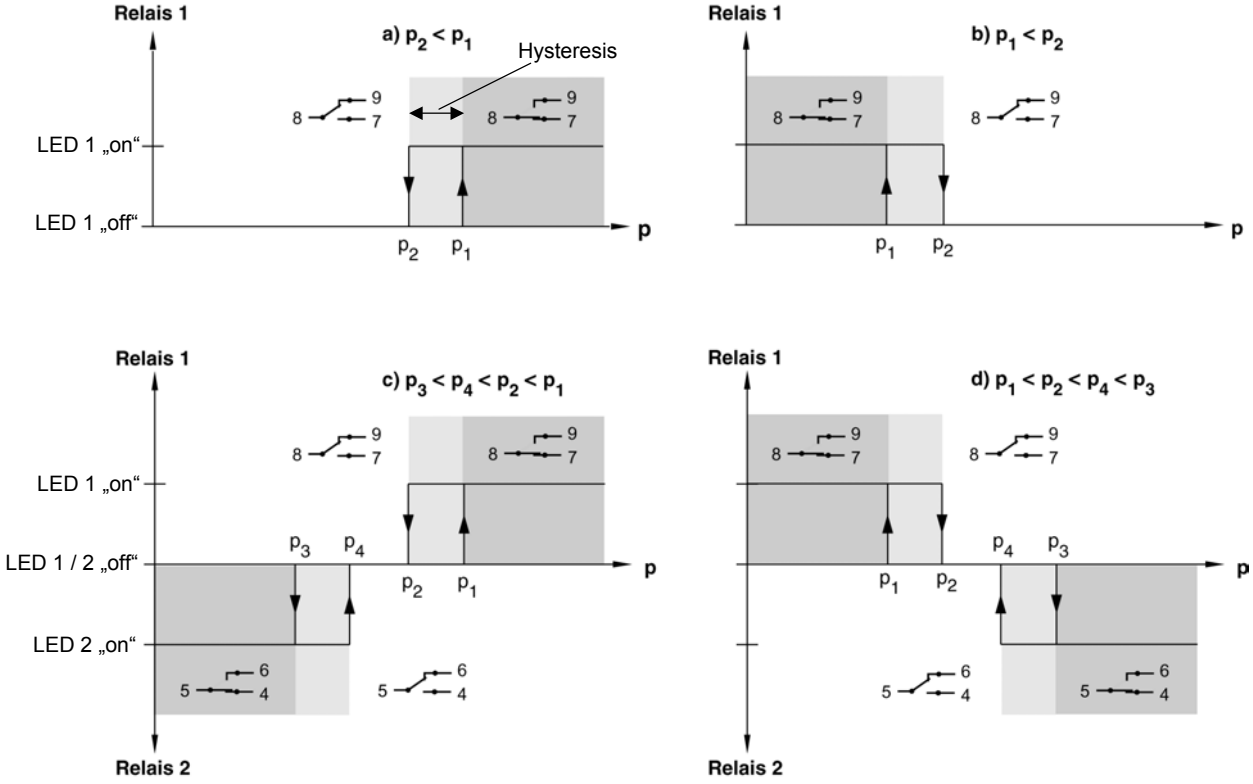
Parameter	Description
Basic Settings	
Time constant	Reaction time of display, of the analogue output, and of the switch connections dependent on appropriate parameter setting
Brightness	Brightness of display
Zero point calibration	Choice between automatic and manual zero point calibration
Switch connection 1	
Switch-on value	first pressure limit, the witch switches on, see chapter 2.5
Switch-off value	second pressure limit, the switch switches off, see chapter 2.5
Switch direction	this parameter chooses between the two switch directions of the relays or the transistors, respectively (see chapter 2.5)
Switch connection 2 (analogous to switch connection 1)	
Switch-on value	see above
Switch-off value	see above
Switch direction	see above

Diagram 3 parameters of the Pressure Controller REG 21

2.5 Switching Behaviour

The set parameters concerning switch-on values, switch-off values and switch directions determine the switching behaviour of the switch connections.

Both switch connections function as two point controller or three point controller. The illustrations below show how. They also illustrate the different switching behaviours.



p: pressure
p_1: switch-on value relay 1
p_2: switch-off value relay 1
p_3: switch-on value relay 2
p_4: switch-off value relay 2

switch direction relay 1

switch direction relay 2

the figures illustrate the allocation of the clamps (see diagram 6)

Diagram 4 switching behaviour of the switch connections; a) switch direction “0”; b) relay 1 functions as two point controller; c), d) relays 1 and 2 combined as three point controller

The switch connection directions in diagram 4 are illustrated as follows:

↔ „transistor blocked“

↔ „transistor open“.

If a switch connection’s parameter is set to “1”, its switching behaviour is reversed. See diagram 4:

↔

„transistor blocked“ ↔ „transistor open“.

2.6 Zero Point Calibration

Both manual and automatic zero point calibrations are possible. Determine the way of calibration by adjusting the parameter “zero point calibration” (see chapter 5.1).

- If the device is set to “automatic zero point calibration”, the automatic calibration will be carried out directly after activation, then again 15 minutes later and then every 60 minutes.
- If the device is set to “manual zero point calibration”, the automatic calibration is turned off.

If you trigger off manual zero point calibration (according to diagram 2), it will be carried out even if the calibration is set to “automatic zero point calibration”.

INFORMATION! *Devices without short-circuit valves (see chapter 3.3) are not able to carry out autmoatic calibrations..*

2.6.1 Process of Zero Point Calibration

To run the calibration a valve shuts down both pressure inlets for six seconds (Δp = 0).

It takes 3 seconds to check wether zero point offset lies within the tolerance range. If this isn’t the case, e.g. because the pressure measuring device doesn’t work properly, error message E004 ensues.

If the deviation lies within the tolerance range, it is measured for another 3 seconds to determine a mean value.

After opening the pneumatic short-circuit connection the device turns back to the function “measuring”. The measuring values are tuned in on the zero point offset.

INFORMATION! *It is not possible to control the pressure during zero point calibration. The value measured last before the calibration will be saved and displayed.*

2.7 Overload Protection

INFORMATION! *Only for devices fitted with short-circuit valves (see chapter 3.3).*

The valve serving to calibrate the zero point also fulfills another function. It short-circuits the pressure inlets as soon as the pressure (measured differential pressure) exceeds the nominal pressure (pressure limit) by more than 50%.

3 Identification

3.1 Scope of Delivery

- type of device according to order
- this manual

3.2 Labelling

The label indicates the

- measuring range
- type of analogue output
- accuracy class
- supply voltage
- number and type of switch connections
- item number
- CE-sign

The second label indicates the connection assignment.

3.3 Variants

The device is available in the following variants:

measuring range:	±0 ... 50 Pa bis ±0 ... 100 kPa			
analogue output:	0 ... 10 V	-5 ... 5 V	0 ... 20 mA	4 ... 20 mA
voltage supply:	230 V-AC	115 V-AC	24 V-AC	24 V-DC
switch connections:	2 relays		2 transistors	
zero point calibration and overload protection:	short-circuit valve (automatic zero point calibration poossible; overload protection given)		no short-circuit valve (automatic zero point calibration **not** possible; **no** overload protection)	

Table 4

4 Installation and electric connections

4.1 Installation

⇒ The device should be installed in a control panel with a gap of 92 + 0,8 mm x 45 + 0,6 mm (including the fastening parts)

4.2 Connections

4.2.1 Pressure Ports

⇒ connect reference pressure hose (Ø 6,5 mm) to pressure port “-“

⇒ pressure measuring hose (Ø 6,5 mm) to pressure port “+”

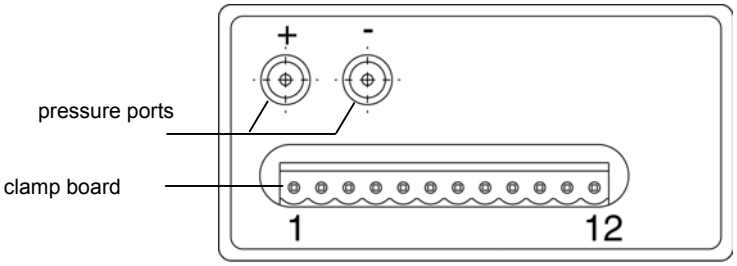


Diagram 5 back view of pressure transducer REG 21

4.2.2 Electric Connections

ATTENTION! *This device is available in several variants. Make sure to identify the right electric connections by checking the first an second label according to the characteristics given in chapter 3.2.*

WARNING! DANGER! ELECTRIC SHOCK! *Make sure at all costs that the connections are not live and the device is not connected to the power supply system while connecting the wires to the ports.*

INFORMATION! This device is delivered without earth potential.

→ Connect the electric sockets according to diagram 6 or the instructions on the label.

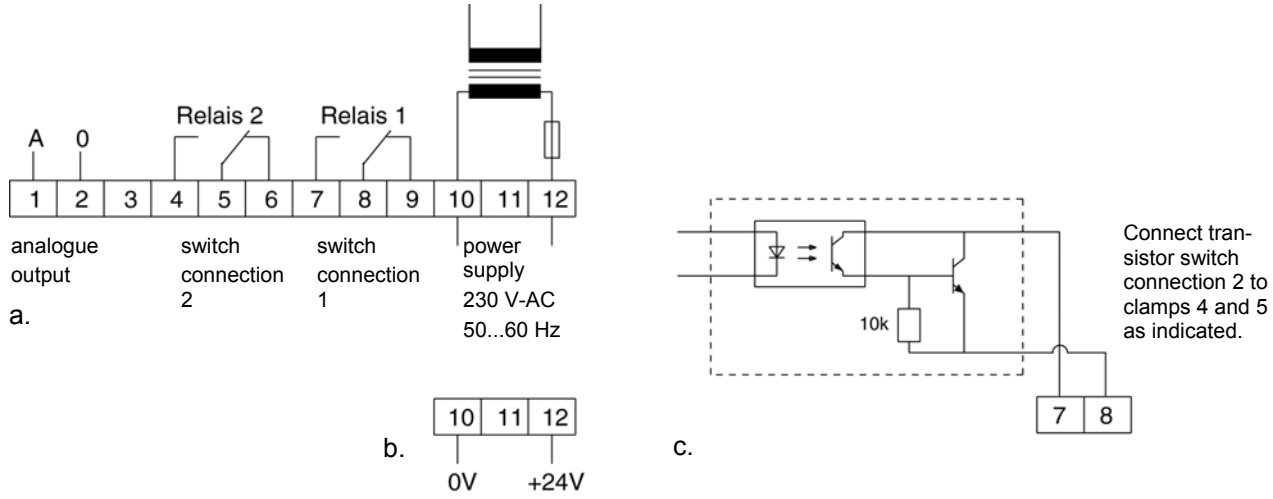


Diagram 6 socket assignment of clamp board in illustration 5: a. standard device with 24 V / 115 V-AC optional; 24 V-DC optional; c. optically coupled transistor switch connection (output 1).

5 Activation

Activate the device by connecting it to the power supply system.

The activation triggers off the following automatic process:

- All the display segments flash on for two seconds to check if they work. Both connections are switched off, the corresponding LED don't flash.
- The basic settings will be checked automatically. In case of trouble an error message ensues (see chapter 6).
- If the automatic zero point calibration is activated, it will now be carried out. If the zero point lies outside the tolerance range, an error message ensues (see chapter 6).
- Switch over to control mode and display mode:
    - display of actual pressure
    - display of proportional analogue output
    - direction of switch connections according to pre-set parameters
    - display of switch position by LED

→ parameter setting of the device according to chapter 5.1.

After finishing the setting the device turns to control and display mode. It can now take on its measuring, controlling and regulating tasks.

5.1 Parameters

INFORMATION!

- *If the parameters are not accepted within 5 s after calling up the parameter functions, the device switches back into control and display mode.*
- *Press set keys 1 or 2 to to leave the parameter mode during the setting of parameters (before finishing it by pressing the enter key) ◄.*
- *If the parameters are not accepted within 30 s during the setting of parameters the device switches back into control and display mode.*

The parameters will not be affected.

Pressure control and switch control remain active while setting.

ATTENTION! The switch values to be set must show hysteresis (see diagram 15) to suppress periodical or uncontrollable switching of the transistors.

5.1.1 Overview Parameters and Functions

Parameter	Parameter Identification	Options	Default values
Basic Settings:		Set 1 + Set 2 → 0---0 (function) press simultaneously for < 2 s*	
Time constant	0---0 Parameters	n 1, n 2, n 5, n 10 F 1, F 2, F 5, F 10 1, 2, 5, 10: time constants in s n: this time constant applies to display, analogue output and switch connections F: this time constant applies to display and analogue output; the switch connections spring into action within 20 ms	F 1
Brightness	1---0	value1...15	5
Zero point calibration	2---0	AU: automatic zero point calibration nor: manual zero point calibration	nor
Switch connection 1		Set 1 press for > 2 s → 0---1	
switch-on value	0---1	entire measuring range	35 %
switch-off value	1---1	entire measuring range	25 %
switch direction	2---1	0, 1	0
Switch connection 2:		Set 2 press for > 2 s → 0---2	
switch-on value		entire measuring range	50 %
switch-off value	1---2	entire measuring range	10 %
switch direction	2---2	0, 1	0

* press for < 2 s: press keys until the decimal points in the display start flashing (see illustration 7 (2))

** press for > 2 s: press keys until the release code “PPP” flashes on (see illustration 7 (3))

5.1.2 How to start Parameter Functions

(see diagram 7)

⇒ Call-up the desired functions according to illustration 5 (1).

⇒ Start the Parameter functions by pressing keys in the following order: ◄, ▲, ◄ (**4**).

You have now started the “parameter identification mode”. (**5**).

Example: Call-up “basic settings”

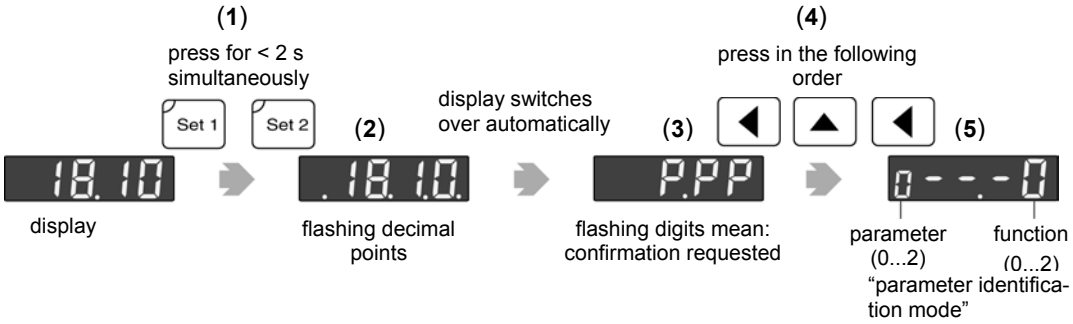


Illustration 8

5.2 Setting the Parameters

Set any single digit of the parameter values according to the following scheme (see illustration 8).

Based on the “parameter identification mode”:

→ select parameter by pressing ▲ (0).

→ open parameter set mode by pressing enter ◄ (1).

The display now indicates the previously set parameter value (2).

→ change the value by pressing ▲ (as often as necessary) (3).

→ press enter◄ to finish the selection (4).

→ save the set values by pressing one of the set keys set 1 or set 2 (5).

The display switches over to the setting of the next parameter (6).

⇒ → Set other parameters as above (7).

Example: Setting the parameter within the mode “basic setings”

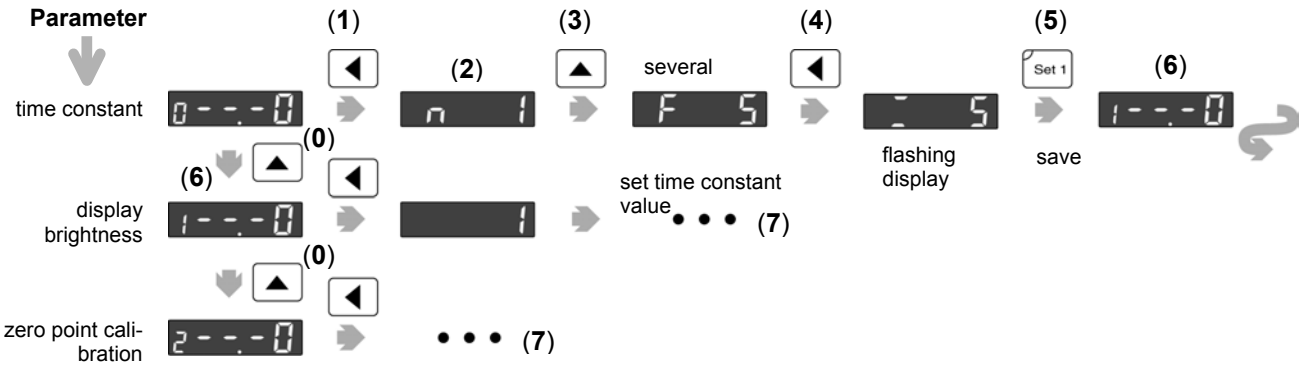


Illustration 8

5.2.1 How to set Switch Value Parameters

open set parameter mode by pressing enter ◄ (1).

The display indicates the actual value. The last fugre flashes (2).

→ set the digits from right to left:

→ set flashing digits (and the sign) by pressing ▲ (3).

→ press enter ◄ to set the next digit to the left (4).

→ finish the setting by pressing enter ◄ (4).

→ save set values by pressing one of the set keys set 1 or set 2 (6).

The parameter identification mode switches over to the next parameter (7).

Example: Setting of the switch value of switch connection 1

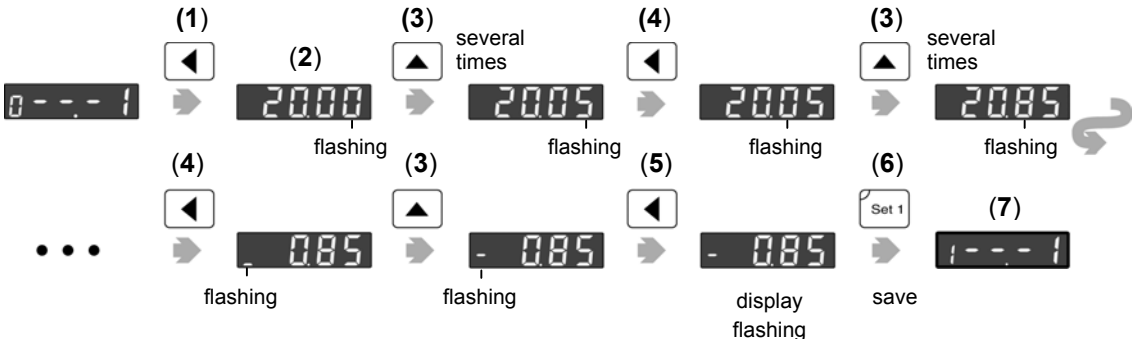


Illustration 9

6 Troubleshooting

Error messages and their meanings:

Error message	Problem	Cause	Remedy
E003	Pressure measuring unit overloaded	high pressure	send device to manufacturer and have it repaired
E004	Pressure measuring unit under pressure during zero point calibration	Pressure applied measuring unit out of order	release Pressure send device to manufacturer and have it repaired

Table 6

7 Technical Data

Measured data	
Measuring range	± 0 … 50 Pa to ± 0 … 100 kPa; see type label
Measuring principle	inductive
Volume range	0,1...0,3 ml
Excess pressure	200 times (measuring range < 2,5 kPa)
	600 kPa (measuring range > 2,5 kPa)
Linearity	± 1%
	± 0.5 % optional for measuring ranges > 250 Pa
measured value deviation / temperature	0,04% / K (+10° to +50°C)
zero point deviation / temperature	0,04% / K (+10° to +50°C)
zero point deviation / time	0,5 % / per year
environmental conditions	
Medium	Air, all non-aggressive gases
Operating temperature	+10° to +50°C
Storage temperature	-10° to +70°C
relative atmospheric humiditiy	0 ... 80 %
EMV-norms	EN 55011; EN 61000-4-3, EN 61000-4-6
Conformity	CE Declaration of conformitiy available on demand.
Electrical Data	
Power input	3 VA
Supply voltage	
standard	230 V-AC, +6 % / -15 % (50...60 Hz)
optional	24 V-AC, 115 V-AC, +6 % / -15 % (50…60 Hz)
optional	24 V-DC, +20 % / -15 %
analogue output	
standard	0…10 V; (R_L > 2 KΩ)
optional	-5 ... 5 V; 0 ... 20 mA; 4 ... 20mA
Time constant	1 s (standard); 2, 5, or 10 s optional
Switch connections	
standard	2 relays floating contact; limit 230 V-AC (50 / 60 Hz); 6 A ohmic load
optional	2 bipolar NPN-transistors; U_{CE} < 50 V; I_C < 200 mA; floating contacts
Time constant	20 ms (standard); 1, 2, 5, or 10 s optional
electrical connection	12-pin socket rail
Connection cross sections	0,5 ... 2 mm^2
Mechanical Data	
Pressure connection	2 hose connections Ø 6.5 mm
Housing material	fibre glass reinforced Noryl
Installation position	horizontal

Table 7

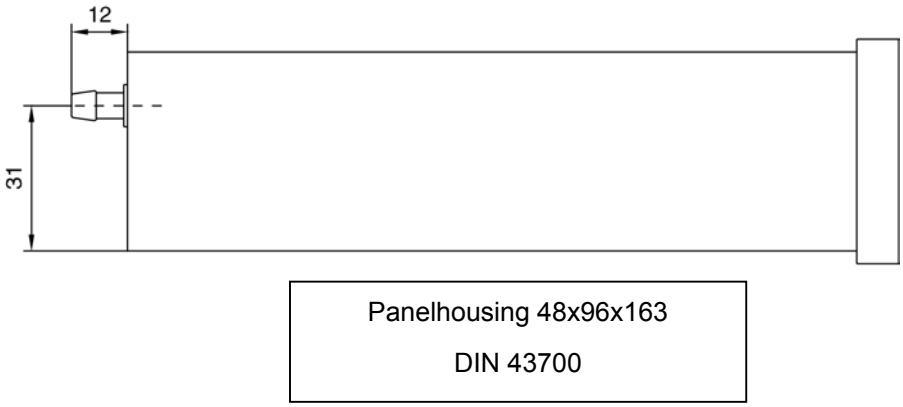


Illustration 10 housing dimensions